

above that level. Treatment should be initiated with 40-100 meq sodium bicarbonate and further alkali therapy based on arterial blood pH measurements.

Ventricular pacing. If shock and marked bradycardia co-exist, increase in ventricular rate via catheter electrode pacing is often of great clinical benefit.

Newer pharmacological approaches such as the use of sympathetic blocking agents and other inotropic drugs, such as dopamine and glucagon, are still in the experimental stage.

Effective management of shock requires not only initiation of the correct therapy in the correct amounts, but also close continuous monitoring of cardiovascular function. Adrenergic drugs should be weaned and discontinued as soon as possible. Blood volume may be inadequate after cardiac function is improved, and a falling CVP may be an indication for administration of dextran, even in patients who have manifested heart failure only a few hours before. If rhythm disturbances persist electrical pacing through a transvenous pacemaker may help improve peripheral blood flow.

It is clear that intelligent use of the means currently available can be effective in salvaging many patients who would otherwise succumb to cardiogenic shock. In others, however, the impairment in cardiac performance is so severe that medical therapy is ineffective. In this selected group of patients mechanical means of temporary circulatory support may eventually become an important adjunct to management.

Pesticide Poisoning May Appear Anywhere

A Statement prepared by the Committee on Occupational Health of the California Medical Association in cooperation with the Bureau of Occupational Health, California Department of Public Health.

CONTAMINATION OF CONSUMER goods from spills of toxic chemicals occurring in storage and transit have resulted in bizarre and tragic episodes of poisoning involving hundreds of people. Incidents of less severe nature, but somewhat similar to those that have occurred in Colombia, Saudi Arabia and Mexico, have taken place in California. The in-

creasing amount of such materials being transported and stored in California increases the probability of further accidents here. Significant contamination can occur from a very small amount of a very toxic pesticide and a poisoning may result from either ingestion or skin absorption. There has been an increase in spills of toxic pesticides due to containers falling from trucks on the highways. There has also been an increase in the use of such pesticides for suicidal purposes.

Every physician in California, whether practicing in an urban or a rural area, should be able to recognize and treat promptly poisoning from phosphate ester pesticides. This capability can frequently save lives of poison victims who have absorbed several potentially fatal doses.

The antidotes for poisoning by these anticholinesterase chemicals are large doses of atropine and Protopam chloride.* An adequate supply should be readily available to the physicians and hospitals in all areas of the state.

There are hundreds of pesticides ranging in wide degrees of toxicity. The name or type of chemical must be known before specific treatment can be instituted. However, it is the phosphate ester pesticides with which the physician should be most familiar. Among the most toxic are TEPP (tetraethylpyrophosphate), Phosdrin® (alpha isomer of 2-carbomethoxy-1-methylvinyl dimethyl phosphate), parathion, methyl parathion, Thimet® (phorate), Di-Syston® (sulfur analog of demeton), and Systox® (demeton).

Diagnosis and Treatment

Signs and symptoms are explainable on the basis of cholinesterase inhibition. Symptoms may be delayed for several hours after last exposure, but rarely for a longer period than 12 hours. Early or mild poisoning is hard to identify since it can be confused with other conditions, such as heat exhaustion, gastritis, encephalitis, asthma, pneumonia, or other respiratory infections. Glycosuria can be found in 30 percent of the cases and diabetic coma mistakenly considered. Symptoms most often appear in the following order: headache, fatigue, giddiness, nausea, salivation, sweating, blurred vision, tightness in chest, abdominal cramps, vomiting, and diarrhea. In severe poisoning, difficult breathing, tremors, convulsions, collapse, coma, pulmonary edema, and respiratory

*Protopam chloride® (pralidoxime chloride, 2-PAM) is a product of the Ayerst Laboratories, Inc., New York, N.Y.

failure follow. Pupils are constricted in about 80 percent of the cases, but in the remainder may be dilated.

The more advanced the poisoning the more obvious are the typical signs: myosis, rapid asthmatic breathing, and pronounced weakness coupled with excessive sweat and accumulation of bronchial fluids. If the picture is clear, treatment should begin at once even if a history of exposure is not obtained.

A red cell and plasma cholinesterase test should be performed when phosphate ester poisoning is suspected. In adults with symptoms, the red cell cholinesterase activity is usually reduced to below 0.20 Δ pH per hour and may approach zero in severe poisoning. The red cell test reflects the initial clinical state of the patient at the time of the testing. Victims of fatal poisoning should have blood and brain cholinesterase determinations to avoid a missed diagnosis.

Treatment

1. Support respiration. This is of great importance since death is usually from respiratory failure.
2. Decontamination. Remove contaminated clothing; wash skin, hair, and fingernails with soap and water; if in eyes, irrigate for 15 minutes with normal saline solution or water; if ingested, induce vomiting or wash stomach and give saline cathartic.
3. Atropine sulphate in large doses after cyanosis is overcome (atropine given to a cyanotic patient may induce ventricular fibrillation). Inject 2 to 4 mg intravenously every 5 to 10

minutes until signs of atropinization appear. Twenty-five to 30 mg may be necessary during the first day.

4. Give Protopam chloride. For severe adult poisoning, inject 1 gram intravenously slowly; give second dose of 0.5 gram in about 30 minutes if muscle weakness is not relieved or recurs. Children's doses should be proportioned by body weight.
5. Watch patient continuously. Emergency lasts 24 to 48 hours.
6. Cholinesterase test*: 10 ml of blood, use heparin as anticoagulant, preferably before giving Protopam chloride. Start treatment without waiting for results.
7. Contraindicated: morphine, aminophylline, theophylline, reserpine, phenothiazin tranquilizers, and large amounts of fluids intravenously. Barbiturates should be used only with great care.

Workers should not take atropine or Protopam chloride as a prophylactic measure nor should they be issued such material for first aid purposes. Poisoned workers should not return to jobs handling phosphate esters until their plasma and red cell cholinesterase has returned to normal. This may take several weeks in the case of the former and as long as a month in the case of the latter.

*Cholinesterase is an enzyme found in many body tissues. It is a simple clinical laboratory procedure to measure cholinesterase activity of plasma and of the red blood cell. The enzyme is inhibited by organic phosphate-type pesticides and, as a result, plasma and red blood cell cholinesterase activity is decreased.

The Michel Electrometric Method is the most widely-used technique for measuring cholinesterase activity. The results are reported in Δ pH units per hour. The normal range for the method is wide, with an average of about 0.77 Δ pH units per hour for red cells (range, 0.39-1.02) and an average of 0.95 Δ pH units per hour for plasma (range, 0.44-1.63). The laboratory performing the cholinesterase test should provide information on the normal values for the method used.

DETECTING ALLERGIC SENSITIVITY IN A CHILD

"A very useful laboratory technique [for detecting an allergy in a child] is the nasal smear, which is quite simple and can be done in 60 seconds by your office technician. Nasal smears are not helpful, however, in the first three months of life because of a physiologic nasal eosinophilia. But after the age of three months, the presence of 10 percent or more eosinophils in the nasal smear is very strong evidence for the presence of allergy."

—GEORGE BRASHER, M.D., Temple, Tex.
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